Empowered by Innovation NEC

PCN-1800 Series

VHF TV Transmitter

2nd Edition

The Benchmark in Analog TV Broadcasting

Compact design and innovative technology establish NEC's new transmitter as the new benchmark in analog TV transmitters.

Proven results

NEC transmitters are renowned throughout the broadcast community for their superior reliability and minimal maintenance requirements. The new PCN series is the outcome of NEC's vast experience in providing thousands of transmitters around the world, applying our sophisticated expertise in product design to set a new standard in ultra-compact VHF analog television transmitters. And now, by employing a new exciter, the PCN-1800 series enables easy conversion to digital TX.

PCN-1800 Series Features

■ Easy conversion to digital TX

After a period of simultaneous analog-digital broadcasting, analog broadcasts will be discontinued. Analog TV transmitters will then be converted to digital and utilized as auxiliary transmitters or main transmitters in order to increase the number of MUXs (multiplexers) and utilize resources more effectively. With this in mind, NEC has come up with a new digitalized exciter that enables easy conversion from analog to digital through the replacement of software in our newest transmitter series.

■ All-band solution

Broadcasters are required to employ broadband-compatible transmitter units in situations that require channel change for common spare units or digital conversion. NEC's PCN-1800 series provides an optimum solution for this requirement. Its exciter features direct modulation and a synthesizer, enabling the transmitter to be used for any VHF channel, simply by changing the frequency setting, and eliminating the need for BPF (Band Pass Filter) adjustment at the exciter stage. Its power amplifier (PA) incorporates a frequency table that automatically adjusts the gain and phase, providing an all-band solution and streamlining frequency adjustment.

■ Superior maintenance function

The automatic correction function in the exciter's compensation circuit makes it extremely easy to perform characteristics adjustment as an automatic compensation, without having to use a demodulator. The color LCD panel enables easy monitoring of transmitter operation. The warning indication facilitates optimum troubleshooting before possible transmitter malfunction, enhancing availability.

■ User-friendly monitoring

The TX control unit features a built-in web server and SNMP. By connecting transmitters to a local area network, transmitters can be monitored and controlled from a remote PC with a web browser. Monitoring and control are also possible using the SNMP manager.

■ Sophisticated hybrid liquid cooling

NEC's extensive liquid cooling experience has enabled us to design a simple but highly efficient cooling method that incorporates an automatic air-purge function and ensures easy water feeding.

The latest digital broadcasting technologies

■ Power Amplifier (PA) features

The PCN-1800 series power amplifier is a compact, highly efficient broadband solid-state amplifier which offers high linearity and incorporates circulators and a self-protection circuit for superior reliability. The PA features a built-in power supply that can be connected and removed, even during TX operation, to ensure prevention of leakage of liquids.

■ DM-3000B Analog Exciter features

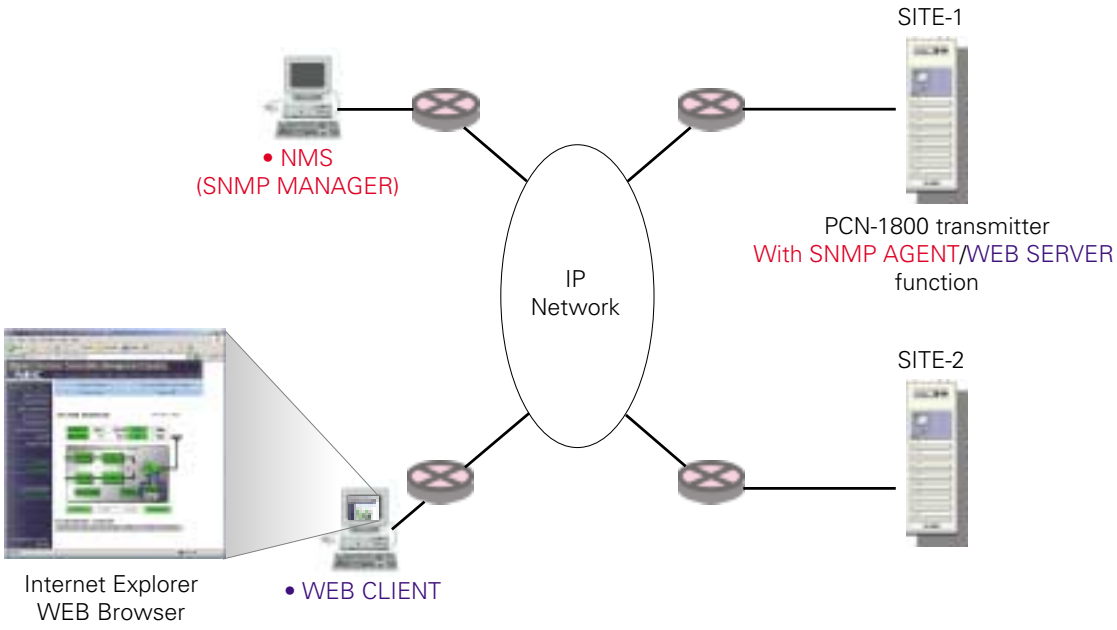
The DM-3000B analog exciter is packed with state-of-the-art NEC technology. Integrating a broad range of functions into a single unit of greatly reduced size, this exciter can be easily upgraded from analog to digital TX system. A synthesizer tuned to all VHF band signals enables all-band direct conversion to an RF output. By employing an all-band synthesizer and direct conversion, any channel can be used simply by setting the compatible frequency. Furthermore, automatic compensation can be performed at the touch of a button, without having to use a demodulator.

■ Control and monitoring system

The control and monitoring system is composed of the TX control unit, an RF detector and a color LCD screen. To enhance transmitter availability, the system is divided into a unit that manages basic control and protection operations and a monitor. The monitor consists of an easy-to-view color LCD screen that enables effortless monitoring of transmitter operation and detects any possible malfunction at a glance.

■ Monitoring system with remote control function

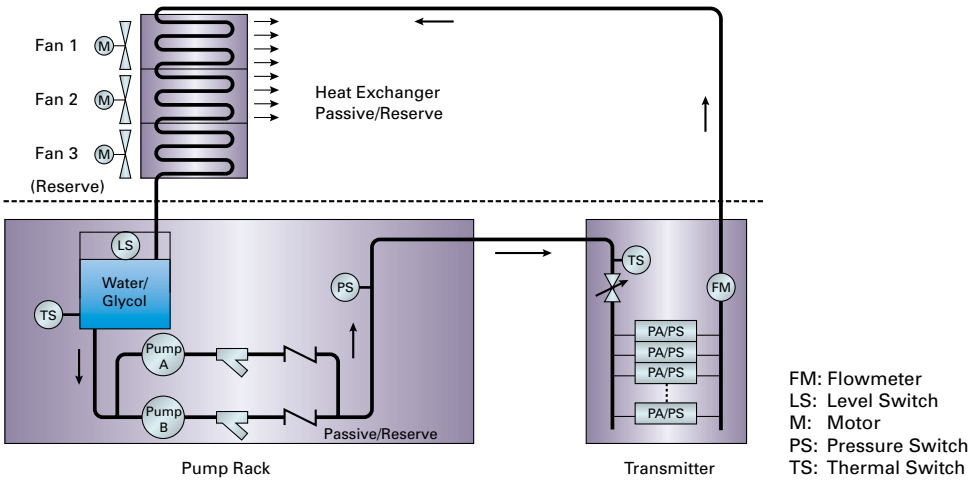
The TX control unit incorporates a web server and SNMP agent, enabling the transmitter to be connected to a local area network for monitoring and control of transmitter operations via a remote PC with web browser. At the same time, monitoring and control from an SNMP manager are also possible.



■ Liquid cooling system

The PCN-1800 series transmitter features an innovative, highly efficient liquid cooling system employing a hybrid closed circuit method that provides such advantages as automatic air purging, easy coolant feeding, coolant replacement during operation and lower overall cooling costs.

NEC's liquid cooling system is based on an original adaptation of common cooling methods. It allows multiple transmitters within the same building to be handled by a single, common cooling system, providing an exceptionally cost- and energy-effective cooling solution.



(Single with Redundancy System)

Configuration of PCN-1800 Series

PCN-1800 Series Lineup

PCN-18 [1] [2] [3] / [4] [5]

1 : Output Power

Type Number	Output Power
01	1kW
02	2kW
05	5kW
10	10kW
15	15kW
20	20kW
30	30kW

2 : System Type

SS: Single Transmitter with Single Drive
SSP: Single Transmitter with Dual Drive and Multiple PAs
SSPE: Single Transmitter with Dual Drive
SSW: Dual Transmitter in Active Reserve

3 : Cooling Type

Q: Liquid Cooling

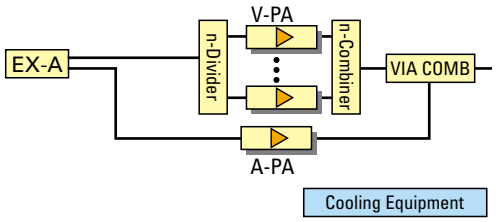
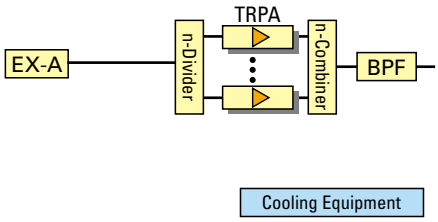
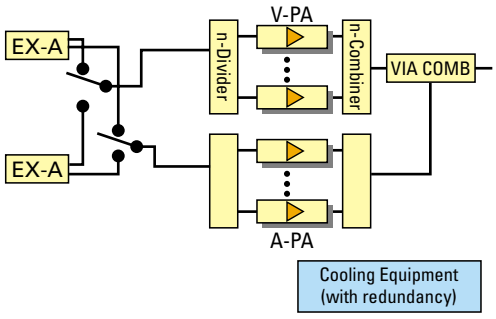
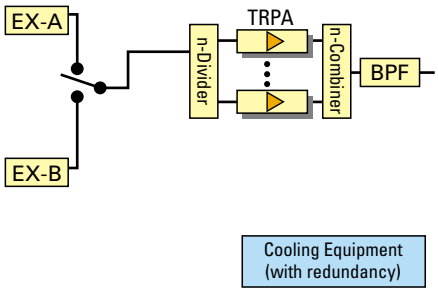
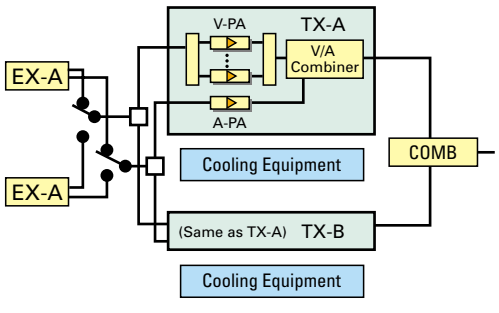
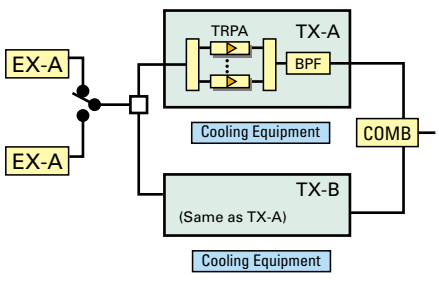
4 : Visual/Aural Power Ratio

1→10:1
5→5:1

5 : Amplifier Mode

Nil: Separate Amplifier
C: Common Amplifier

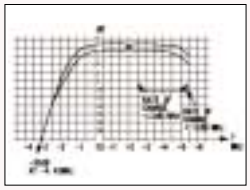
System Configuration

Type	Separate Amplification	Common Amplification
SS		
SSP		
SSW		

Configuration of PCN-1800 Series

PCN-1800 Series Specifications

Visual

<table>
<tr><th>Characteristics</th><th>625-line ITU-R Standard-B/G</th><th>625-line ITU-R Standard-I</th><th>525-line ITU-R Standard-M</th><th>625-line ITU-R Standard D/K</th></tr>
<tr><td>Type of Emission</td><td colspan="4">C3F</td></tr>
<tr><td>Operating Frequency Range</td><td colspan="4">170MHz ~ 230MHz</td></tr>
<tr><td>Carrier Frequency Stability</td><td colspan="4">≦ ± 1 x 10^{-7}/Year</td></tr>
<tr><td>Load Impedance</td><td colspan="4">50Ω with VSWR ≤1.5</td></tr>
<tr><td>Input Level
Sync.</td><td colspan="4">0.3V ± 6dB</td></tr>
<tr><td>Video</td><td colspan="4">0.7V</td></tr>
<tr><td>Input Impedance</td><td colspan="2">75Ω, return loss not less than 34dB up to 5MHz</td><td>75Ω, return loss not less than 34dB up to 4.2MHz</td><td>75Ω, return loss not less than 34dB up to 5MHz</td></tr>
<tr><td>AM Noise
Periodic Noise (1kHZ LPF)</td><td colspan="4">-50dB (p-p) or better</td></tr>
<tr><td>Unweighted Continuous Random Noise</td><td colspan="4">-52dB (r.m.s.) or better</td></tr>
<tr><td>Weighted Continuous Random Noise</td><td colspan="4">-60dB (r.m.s.) or better</td></tr>
<tr><td>Linear Distortion
Frequency vs. Amplitude Response</td><td><table><tr><th>Freq. (MHz)</th><th>Limits (dB)</th></tr><tr><td>-4.43</td><td>-30/-</td></tr><tr><td>-4.43 ~ -1.25</td><td>-20/-</td></tr><tr><td>-1.25 ~ -0.75</td><td>+0.5/-</td></tr><tr><td>-0.75</td><td>+0.5/-4</td></tr><tr><td>-0.5</td><td>+0.5/-1.5</td></tr><tr><td>0 ~ +1.5</td><td>+0.5/-0.5</td></tr><tr><td>+1.5</td><td>Ref.</td></tr><tr><td>+1.5 ~ +4.5</td><td>+0.5/-0.5</td></tr><tr><td>+5</td><td>+0.5/-2.5</td></tr><tr><td>+5.5</td><td>-26/-</td></tr></table></td><td>  </td><td><table><tr><th>Freq. (MHz)</th><th>Limits (dB)</th></tr><tr><td>-3.58</td><td>-42/-</td></tr><tr><td>-3.58 ~ -1.25</td><td>-20/-</td></tr><tr><td>-1.25 ~ -0.75</td><td>+0.5/-</td></tr><tr><td>-0.75</td><td>+0.5/-4</td></tr><tr><td>-0.5</td><td>+0.5/-1.0</td></tr><tr><td>0 ~ +1.5</td><td>+0.5/-0.5</td></tr><tr><td>+1.5</td><td>Ref.</td></tr><tr><td>+1.5 ~ +3.6</td><td>+0.5/-0.5</td></tr><tr><td>+4.18</td><td>+0.5/-2.5</td></tr><tr><td>+4.75</td><td>-30/-</td></tr></table></td><td><table><tr><th>Freq. (MHz)</th><th>Limits (dB)</th></tr><tr><td>-4.33 ± 0.1</td><td>-30/-</td></tr><tr><td>-4.23 ~ -1.25</td><td>-20/-</td></tr><tr><td>-1.25 ~ -0.75</td><td>+0.5/-</td></tr><tr><td>-0.75</td><td>+0.5/-4</td></tr><tr><td>-0.5</td><td>+0.5/-1.5</td></tr><tr><td>0 ~ +1.5</td><td>+0.5/-0.5</td></tr><tr><td>+1.5</td><td>Ref.</td></tr><tr><td>+3.0 ~ +4.5</td><td>+0.5/-1.0</td></tr><tr><td>+6</td><td>+0.5/-4</td></tr><tr><td>+6.5</td><td>-20/-</td></tr></table></td></tr>
<tr><td>Group Delay
Transmitter without RX precorrection measured with phase linear demodulator</td><td colspan="2">•Common Amplification: Up to 4.8MHz: ± 50nS
•Separate Amplification:Up to 4.8MHz: ± 40nS</td><td>•Common Amplification:
Up to 2MHz: ± 50nS
At 3.58MHz: ± 50nS
At 4.18MHz: ± 100nS
•Separate Amplification:
Up to 2MHz: ± 50nS
At 3.58MHz: ± 40nS
At 4.18MHz: ± 80nS</td><td>•Common Amplification:
Up to 4.8MHz: ± 50nS
•Separate Amplification:
Up to 4.8MHz: ± 40nS</td></tr>
<tr><td>Transmitter with RX precorrection measured with standard demodulator</td><td colspan="2">•Common Amplification:
Up to 4.43MHz: ± 50nS
4.43 ~ 4.8MHz: ± 100nS
except ripple caused by SAW filter
•Separate Amplification:
Up to 4.43MHz: ± 40nS
4.43 ~ 4.8MHz: ± 80nS
except ripple caused by SAW filter</td><td>•Common Amplification:
Up to 2MHz: ± 50nS
At 3.58MHz: ± 50nS
At 4.18MHz: ± 100nS
except ripple caused by SAW filter
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except ripple caused by SAW filter
•Separate Amplification:
Up to 4.43MHz: ± 40nS
4.43 ~ 4.8MHz: ± 80nS
except ripple caused by SAW filter</td></tr>
<tr><td>Transient Response</td><td>Measured with a 250kHz square wave (risetime 90 nS):<table><tr><th>Time (µs)</th><th>Limits (%)</th></tr><tr><td>± 0.075</td><td>-10</td></tr><tr><td>± 0.1</td><td>+11</td></tr><tr><td>± 0.2</td><td>± 7</td></tr><tr><td>± (0.4 ~ 1.0)</td><td>± 5</td></tr></table>•Common Amplification:
Measured with a 2T pulse, within 2%K rating.
•Separate Amplification:
Measured with a 2T pulse, within 1.5%K rating.</td><td colspan="3">•Common Amplification: Measured with a 2T pulse, within 2%K rating.
•Separate Amplification: Measured with a 2T pulse, within 1.5%K rating.</td></tr>
<tr><td>Bar Response</td><td colspan="4">Measured with 50Hz and 15kHz square wave, tilt within 2% of the max. amplitude.</td></tr>
<tr><td>Nonlinear Distortion
Diff. Gain*1</td><td colspan="2">•Common Amplification: Within ± 5% at 4.43MHz
•Separate Amplification: Within ± 3% at 4.43MHz</td><td>•Common Amplification:
Within ± 5% at 3.58MHz
•Separate Amplification:
Within ± 3% at 3.58MHz</td><td>•Common Amplification:
Within ± 5% at 4.43MHz
•Separate Amplification:
Within ± 3% at 4.43MHz</td></tr>
<tr><td>Diff. Phase*1</td><td colspan="2">•Common Amplification: Within ± 5° at 4.43MHz
•Separate Amplification: Within ± 3° at 4.43MHz</td><td>•Common Amplification:
Within ± 5° at 3.58MHz
•Separate Amplification:
Within ± 3° at 3.58MHz</td><td>•Common Amplification:
Within ± 5°at 4.43MHz
•Separate Amplification:
Within ± 3° at 4.43MHz</td></tr>
<tr><td>Output Power Variation*2
Black to White Transition</td><td colspan="4">Within ± 2%</td></tr>
<tr><td>Blanking Level Stability*2
Black to White Transition</td><td colspan="4">Within ± 2.5%</td></tr>
<tr><td>Incidental Phase Modulation</td><td colspan="4">During full sinusoidal modulation of the visual transmitter between 50Hz and 15,000Hz, -46dB or less, relative to ± 50kHz deviation.
•Common Amplification: Phase modulation less than ± 4°.
•Separate Amplification: Phase modulation less than ± 3°.</td></tr>
</table>

*2: With automatic correction.
*3: For any picture level and variation of ± 6dB in input sync-pulse amplitude.

Aural

Characteristics	625-line ITU-R Standard-B/G	625-line ITU-R Standard-I	525-line ITU-R Standard-M	625-line ITU-R Standard D/K
Type of Emission	F3E			
Output Power	1/5 ~ 1/10 of the output power of visual transmitter			
Operating Frequency Range	170MHz ~ 230MHz			
Carrier Frequency Stability	≦ ± 1 x 10^{-7}/Year			
Load Impedance	50Ω with VSWR≤ 1.5			
Input Level	-4dBm to +16dBm for ± 50kHz deviation		-10dBm to +10dBm for ± 25kHz deviation	-4dBm to +16dBm for ± 50kHz deviation
Input Impedance	600Ω, return loss better than 30dB between 30Hz and 15,000Hz		(1) 600Ω, return loss better than 30dB between 30Hz and 15,000Hz (2) 75Ω, return loss better than 30dB between 30Hz and 120kHz	600Ω, return loss better than 30dB between 30Hz and 15,000Hz
Modulation Capability	Up to ± 100kHz deviation			
FM Noise	•Common Amplification: -55dB or better, relative to 100% mod. at 400Hz •Separate Amplification: -66dB or better, relative to 100% mod. at 400Hz		•Common Amplification: -49dB or better, relative to 100% mod. at 400Hz •Separate Amplification: -60dB or better, relative to 100% mod. at 400Hz	•Common Amplification: -55dB or better, relative to 100% mod. at 400Hz •Separate Amplification: -66dB or better, relative to 100% mod. at 400Hz
AM Noise (without mod.) Synchronous AM Noise (with 100% mod.)*	•Common Amplification: -45dB or better -40dB or better •Separate Amplification: -50dB or better -40dB or better			
Amplitude vs. Frequency Response (with 50% mod.)	Within ± 0.5dB between 30 and 15,000Hz of 50μs ideal preemphasis curve		Within ± 0.5dB between 30 and 15,000Hz of 75μs ideal preemphasis curve	Within ± 0.5dB between 30 and 15,000Hz of 50μs ideal preemphasis curve
Harmonic Distortion (with 100% mod.)	Within 0.5% between 30Hz and 15,000Hz			

*: Relative to 100% AM modulation.

RF

Unwanted Radiation •Spurious Radiation	60dB below the carrier and power not exceeding 1mW (VHF)*1
•Harmonic Radiation	Same as above
Intermodulation Products	•Common Amplification: -53dB (3 Tone Intermodulation Products)

*1: 80dB below the carrier can be realized by addition of a spurious filter.

General

Power Supply	200/208/220/230/volts, 3-phase, 3-wire or 380/400/415 volts, 3-phase, 4-wire
Voltage Fluctuation	+10%, -15%, 50/60Hz ±2%
Power Factor	More than 90%
Ambient Temperature	Indoors: 0°C ~ +45°C Outdoors: 0°C ~ +45°C (or using antifreeze and 3 way valve system : -30°C ~ +40°C)
Altitude	Below 2,500m (modification for higher altitude possible)

Specifications, designs, etc. are subject to change without notice.

Line-up of PCN-1800 Series

Single Exciter type	Dual Exciter type	Output Power
Common Amplification		
PCN-1801SSHQ/1C	–	1kW
PCN-1802SSHQ/1C	PCN-1802SSPHQ/1C	2kW
PCN-1805SSHQ/1C	PCN-1805SSPHQ/1C	5kW
PCN-1810SSHQ/1C	PCN-1810SSPHQ/1C	10kW
Separate Amplification		
PCN-1805SSHQ/1	PCN-1805SSPHQ/1	5kW
PCN-1810SSHQ/1	PCN-1810SSPHQ/1	10kW
PCN-1815SSHQ/1	PCN-1815SSPHQ/1	15kW
PCN-1820SSHQ/1	PCN-1820SSPHQ/1	20kW
PCN-1830SSHQ/1	PCN-1830SSPHQ/1	30kW

ISO 9000 Series
ISO 9001 JMI-0119
NEC Broadcast and Video

ISO 14001
JQA-E-90066
NEC

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